The Development of the Manufacturing Sector in Indonesia

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I International Comparison on the Industrialization Process

According to a publication by UNIDO [1984], in the last decade Indonesia has become one of the largest producers of manufactured products among developing countries.

With a manufacturing value added share of 0.29% in the world in 1981, Indonesia was ranked seventh among developing countries as shown in Table 1.

Around a decade earlier, Indonesian manufacturing accounted for only a 0.12% share of world manufacturing value added, and was ranked seventeenth. Clearly, the Indonesian manufacturing sector has expanded rapidly in the last decade.

The share of manufacturing value added in the Indonesian GDP increased from 9.6% in 1973 to 10.8% in 1981 according to the Central Bureau of Statistics (BPS) of Indonesia. However, this share of manufacturing is much smaller than those in neighboring developing countries, i.e., Philippines (25.7%), Thailand (20.8%) and Singapore (27.6%) (UN Statistics). The share is even smaller than that of India (17.7%), Turkey (18.6%) and Pakistan (18.4%).

This is evidence of the relatively low level of Indonesia's industrialization stage. Some aspects of Indonesian manufacturing industrial development will be further examined by comparison with other ASEAN countries, using *the International Input-Output Table for ASEAN countries of 1975* compiled by Institute of Developing Economies in Japan.

1. *International Comparison of Sectoral Structure*

Using an international input-output table for ASEAN countries, sectoral structure in terms of value added share for each country is shown in Table 2.

In Table 2, the mining sector of Indonesia holds a very high share compared with other countries.

The Indonesian agricultural sector also has a comparatively high share among ASEAN countries. The high shares of

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Table 1 Survey of Manufacturing Activity in Selected Developing Countries

(unit: %)

	Contribution to World Mfg Value Added.		Share of Mfg Value Added in G.D.P.		Average Annual Rate of Growth
	1973	1981	1973	1981	1973-1981
Brazil	1.99	2.41	29.68	28.16	6.2
Mexico	1.08	1.47	23.13	23.48	6.9
India	0.79	0.91	16.48	17.16	5.1
Korea, Republic of	0.25	0.52	23.83	33.79	13.4
Argentina	0.74	0.51	32.63	25.82	−0.8
Turkey	0.73	0.39	20.02	18.64	3.4
Indonesia	0.12	0.29	7.61	12.92	14.6
Philippines	0.22	0.28	25.76	25.66	6.6
Thailand	0.13	0.23	17.54	20.82	10.9
Pakistan	0.13	0.17	17.42	18.38	6.5
Singapore	0.08	0.13	26.71	27.62	10.0

Source: Roepstorff, T. M. 1985. Industrial Development in Indonesia. *Bulletin of Indonesian Economic Studies* 21 (April): 33.

these two sectors reduce the share of manufacturing sector in Indonesia. If Indonesia produced little oil and gas, as do the other ASEAN countries, its manufacturing share would be much larger than the present one.

Therefore, it may be misleading simply to compare the share of Indonesian manufacturing sector with those of other countries. The share of Indonesian agricultural sector (26.0%) ranks second to that of Philippines (26.9 %), and is a little higher than that of Thailand (24.3 %). However, we should note that Philippines and Thailand have a very small mining sector, 0.1% and 1.5%, respectively.

On the contrary, Indonesia has large share of mining, 18.7%. If Indonesia's production of oil and gas were very small, the share of the agricultural sector would be much larger than at present.

Similarly, the share of manufacturing would be higher though still smaller than those of Malaysia, Philippines, Thailand, and Singapore.[1)]

Mining activity in Indonesia is, as ex-

Table 2 Sectoral Structure of Value Added. in Million US$, and (%)

	Indonesia	Malaysia	Philippines	Singapore	Thailand
1. Agriculture	8,532 (26.04)	1,598 (19.07)	4,256 (26.93)	127 (2.48)	4,148 (24.31)
2. Mining	6,141 (18.74)	289 (3.56)	413 (2.61)	6 (0.12)	255 (1.49)
3. Manufacturing	4,754 (14.51)*	2,269 (27.93)	3,064 (19.93)	1,883 (36.82)	3,771 (22.10)
4. Others	13,342 (40.72)	3,969 (48.85)	8,070 (51.07)	3,098 (60.58)	8,888 (52.09)
Total	32,769 (100.00)	8,125 (100.00)	15,803 (100.00)	5,114 (100.00)	17,062 (100.00)

* This share seems high compared to the National Income Statistics, which are only around 8.9% based on current prices and 11.1% based on 1973 constant prices.

Note: The value added share in this table is somewhat different from that of UN Statistics mentioned above due to a different method of calculation.

Source: Institute of Developing Economies [1982]

plained, very high compared to other ASEAN countries. Despite of the high share of mining, specifically oil, in the GDP, it should be noted that the oil and gas sector's "backward linkage" is one of the lowest. (Linkage analysis will be discussed in more detail later). Low backward linkage means low incentive compared to other industries. Of course, this is not intended to belittle the contribution that oil has made to the development process of Indonesia.

2. *Structual Characteristics of the Manufacturing Sector*

In this section we will analyse in more detail the characteristics of the Indonesian manufacturing sector. For the shake of analysis, total output and value added of each manufacturing industry in Indonesia will be compared with those of other ASEAN countries.

Total Output

The Indonesian manufacturing sector is the largest among the five ASEAN countries. As is shown in Appendix 1, in 1975 Indonesian manufacturing activities in terms of total output were approximately double those of Singapore and Malaysia, and 1.4 times larger than that of Philippines and Thailand.

However, more than half of the Indonesian manufacturing output consists of consumption goods, such as food and textiles. Appendix 2 shows that the Indonesian food industry has a 53.9% share in total manufacturing, the highest figure among ASEAN countries.

In other countries the food industry does not exceed 50%. Shares of machinery and metal products in Indonesia, on the other hand, are the lowest among ASEAN countries: 2.4% for machinery and 3.6% for metal products.

Appendix 3 shows the distribution of manufactured products among five ASEAN countries. Indonesian share of total manufacturing sector is 29.9%.

The Indonesian transport equipment industry, where two thirds of input is derived from motor vehicle assembly and motorcycle manufacturing, is conspicuously high among ASEAN countries (45.93%).

The composition of manufacturing output in developing countries has drastically changed between 1963 and 1975 as a UNIDO report [1981: 51–52] points out.

According to UNIDO, with the exception of plastic products, all branches of light industries declined in importance in this period. These declines were compensated by gains in heavy manufacturing, especially in industrial chemicals, petroleum, refinery, machinery and transport equipment. In the case of the transport equipment industry, the share of output in the manufacturing sector of all developing countries increased to 7.6% as a result of industrialization between 1963 and 1975. Approximately the same is true of the share of the transport equipment industries of ASEAN countries as seen in Appendix 2.

It is notable that Indonesian output of transport equipment is almost half that of total ASEAN output and is 11% of its

1) If there were no mining activities in Indonesia, the total value added of the manufacturing sector would be 18%. This share is still smaller than those of the other ASEAN countries.

Table 3 Output Composition of Transport Equipment Industry in 1983

(%)

Shipbuilding	13.1
Motor Vehicle, assembly	38.1
Motorcycle	36.9
Bicycle	18.4
Motor, Vehicle, body and equipment	5.4
Others	5.5

Source: Biro Pusat Statistik, *Statistik Industri 1983*.

total domestic manufacturing output. Table 3 shows the output composition of the transport equipment industry in Indonesia.

As shown in Table 3, motor vehicle assembly and motorcycle products have occupied two thirds of the output of transport equipment industry in Indonesia. The food product industry in Indonesia also has an above average share (38.7%), whereas other manufactured products (12.2%), machinery (13.0%), petroleum and petroleum products (16.2%) and metal products (17.0%) are in the lowest group, far below the average ASEAN sectoral composition.

Value Added

The significance of a country's manufacturing sector can be seen in the mere size of its value added. The Indonesian manufacturing sector total value added shown in Appendix 4 is the largest figure among the five ASEAN countries.

The ratio of value added should be particularly noted. Appendix 4 shows that Indonesian value added is 2.1 times larger than that of Malaysia, whereas Indonesian total output is 2.7 times larger than that of Malaysia, as we also observed in Appendix 1. This difference can be explained by two factors; i.e., value added ratio of each industry (Appendix 5) and output composition (Appendix 2), which differ considerably between these two countries.

Another perspective of the manufacturing sector, which also serves to reflect the level of industrialization, is gained by using the idea of value added with Hoffmann's ratio [1958].

Hoffmann proposed to divide the manufacturing industry into two groups, namely, consumption and capital goods. According to Hoffmann's analysis of actual data for more than twenty countries, the consumption good industry is a leading sector at the early stage of industrialization. However, compared to capital goods, its share gradually diminishes as industrialization develops. Evidence of the above rule was commonly found in the industrialization process in almost every country. Hoffmann then proposed ratios to classify four stages of industrialization as follows:

Stage of Industrialization	Ratio of Industrial Consumption Goods Value Added to Industrial Capital Goods Value Added
First stage	5 – 6
Second stage	2.5–3.5
Third stage	1 – 2
Fourth stage	Less 1

Table 4 shows Hoffmann's ratio for ASEAN countries based on Appendix 6.[2)]

Hoffmann's rule may oversimplify the

2) The definition of capital goods and consumption goods industries is not clearly established. Subtotals in Appendix 6 are used for the outputs of these two industries for the shake of our analysis.

Table 4 Hoffmann's Ratio for ASEAN Countries Using a Value Added Basis

Country	Ratio of Industrial Consumption Goods Value Added Over Industrial Capital Goods Value Added
Indonesia	3.2
Malaysia	2.0
Philippines	4.1
Singapore	1.1
Thailand	3.2
ASEAN average	2.7

Source: Institute of Developing Economies [1982]

structure of the economy. However, it may be still useful for an overview of the development stage. According to Hoffmann's rule, Philippines is in the first stage of industrialization. Indonesia and Thailand are in the second stage, while Malaysia and Singapore are found in the third stage.

II Industrial Development in Indonesia

1. Value Added, Employment and Industrial Growth

The Structure of Value Added

Industrial growth during the 1970's diversified the structure of the manufacturing sector. Sectors such as iron and steel, electric machinery, and fabricated metal products, for example, which were relatively capital intensive, had a very high growth rate as seen in Table 5. The sectors which were related to the agriculture sector, i.e., food products, beverages and tobacco accounted for 63.8% of total manufacturing value added in 1971, and then declined to 31.7% in 1980. The important contribution of the textile industry in the early 1970's also declined slightly by 1980.

On the contrary, chemicals, wood products, transport equipment, other non-metallic mineral products, electrical machinery, rubber products, fabricated metal, iron and steel products exhibited a high growth rate, and thus, gained higher shares of total manufacturing value added.

Domestic markets for most of the consumer goods were saturated after 1975. Consistent with the trend in NICS, especially after 1978/1979 with ample foreign exchange earnings from the oil boom, industrial development took place more in upstream basic industries, machinery and component manufacturing industries producing spare parts for automobiles, motorcycles and airplanes.

Thus, the pattern of structural change within manufacturing sectors entailed a gradual shift from consumer goods to intermediate and capital goods. The share of consumer goods in total manufacturing declined from 80.8% in 1971 to 47.6% in 1980. Shares of intermediate and capital goods sectors dramatically increased from 13.1% in 1971 to 35.5% in 1981 and from 6.1% in 1971 to 16.9% in 1981, respectively. The main sources of industrial growth were increases in domestic demand and import substitution activities which had taken place during this period. With the development of the consumer goods industry, markets for intermediate and capital goods grew. That situation in combination with the environment or investment climate in the period fostered the development of intermediate and capital goods industries

Table 5 Structural Changes of Value Added in Selected Manufacturing Sectors 1971 and 1980

ISIC Code	ISIC Description	Share of Total[a] 1971 (%)	Share of Total[a] 1980 (%)	Average Annual Growth of MVA 1970–1981[b] (%)
Mainly Consumer Goods		80.8	47.6	-
3110	Food Products	33.9	11.1	13.61
3130	Beverages	2.0	1.5	9.26
3140	Tobacco	27.9	19.1	9.64
3210	Textiles	13.2	12.4	10.83
3220	Wearing apparel (except, footwear)	0.1	0.4	12.56[c]
3240	Footwear (except rubber or plastic)	0.6	0.8	9.05
3320	Furniture, except metal	0.3	0.2	18.72[d]
3420	Printing and publishing	2.0	1.5	34.32[c]
Mainly Intermediate Goods		13.1	35.5	-
3230	Leather products	0.3	0.2	31.48[d]
3310	Wood products, except furniture	1.4	7.0	19.15
3410	Paper and products	2.0	1.5	14.73
3510	Industrial Chemicals	0.8	4.3	19.62
3520	Other chemicals	3.8	7.1	4.53
3550	Rubber products	1.3	4.8	22.21
3560	Plastic products	0.5	0.7	33.23[d]
3620	Glass and products	0.5	1.1	17.56
3690	Other non-metallic mineral products	2.5	5.9	27.79
3710	Iron and Steel	-	3.1	51.35
Mainly Capital Goods		6.1	16.9	-
3810	Fabricated metal products	2.3	3.5	18.86
3820	Machinery, except electrical	0.4	1.6	19.01
3830	Machinery electric	2.5	5.3	29.20
3840	Transport equipment	0.9	6.4	7.31
	Total manufacturing	100.0	100.0	11.88

a) Based on Rp in current prices
b) Based on constant 1975 prices
c) 1970–75
d) 1970–76

Note: Figures in this table sometimes are significantly different from the ones obtained from input-output tables used throughout in this paper due to differences in definition.

Source: Roepstorff [1985]

relative to consumer goods industry.

Light consumer goods such as food, beverages and cigarettes showed a slower growth rate, while new, more capital and technological intensive industries producing intermediate, durable consumer and capital

Table 6 Number of Establishment, Employment and Value Added in Manufacturing Sector

	Number of Establishment		Employment (persons)		Value Added (billion Rp)	
	1974/75	1979	1974/75	1979	1974/75	1979
Large and Medium	7,091 (0.55)	7,960 (0.52)	661,704 (13.49)	870,019 (19.39)	476.9 (77.86)	1,660.5 (77.62)
Small	48,186 (3.74)	113,024 (7.33)	343,240 (7.00)	827,035 (18.41)	53.0 (8.65)	187.3 (8.76)
Cottage	1,234,511 (95.91)	1,418,802 (92.14)	3,899,856 (79.55)	2,794,833 (62.22)	82.5 (13.47)	291.4 (13.62)
Total	1,289,788 (100.0)	1,538,786 (100.0)	4,904,800 (100.0)	4,491,887 (100.0)	612.5 (100.0)	2,139.2 (100.0)

Large =100 or more Small =5 to 19 persons
Medium=20 to 99 Cottage=less than 5
Sources: Biro Pusat Statistik

goods, such as iron, steel and machineries, developed with higher growth rates to satisfy the increasing demand.

Employment Structure

According to official statistics, small and cottage scale industry in Indonesia together accounted for 87% of total manufacturing employment in 1974–75 and for 80% in 1979.

As shown in Table 6, the small and cottage scale establishments absorbed most of the laborers in the manufacturing sector, but contributed very little to total value added. On the contrary, the large and medium firms employed only 19% of the manufacturing laborers, but contributed 78% to the total value added in this sector in 1979. The share attributed to small manufacturing firms is 18% in terms of employment and 9% in value added, while the cottage industries absorbed 62% of the laborers and contributed more than 13% overall value added in manufacturing sector.

These data clearly show that the large and medium manufacturing establishments in Indonesia contributed significantly to value added, while small and cottage scale manufacturing industries have absorbed more labor than the large and medium scale industries.

The small and cottage scale establishments, which accounted for only slightly more than 20% of manufacturing value added, have played an extremely role in the employment of laborers. This extreme heterogeneity which exists between value added and employment in the manufacturing industry is a characteristic feature of that sector in Indonesia. Depending upon the actual situation, employment promotion might be better oriented to the small and cottage scale sectors, while growth oriented policy might be more wisely focussed on the large and medium firms in the modern sectors. Under such circumstances, policy makers might find themselves in a dilemma over employment and growth.

2. *Capital and Labor Intensity in Indonesia*

Capital and labor intensities are useful measures for analysing the characteristics of industries and establishing development

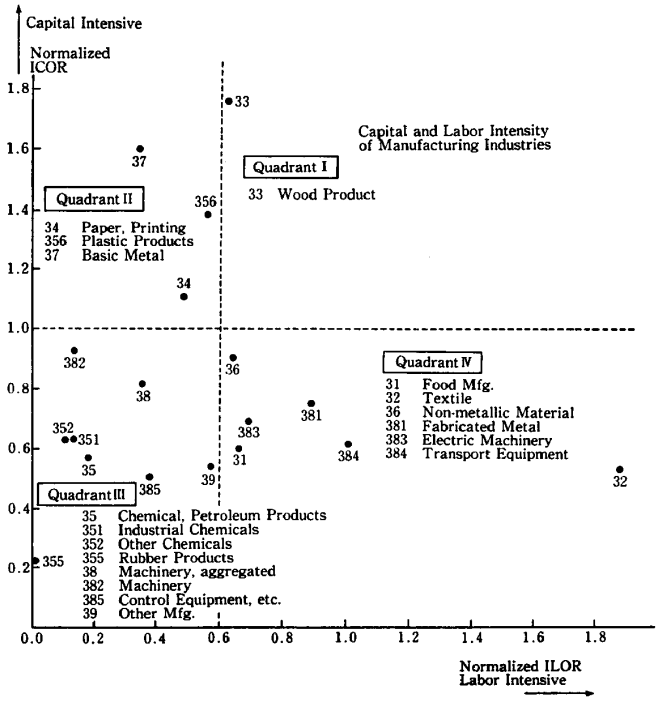


Fig. 1 Normalized ICOR and ILOR of Indonesian Manufacturing Industries

strategies. In the case of Indonesia, the incremental capital output ratio (ICOR) and the incremental labor output ratio (ILOR) are available for manufacturing industries from the Indonesia Ministry Industry.[3] The following analysis will be based on these data. ICOR is defined as the ratio of investment with changes in output with some time lag. Likewise with ILOR as the ratio of changes in labor with changes in output.

Appendix 8 is calculated to compare ICOR and ILOR for each manufacturing industry. Also, ICOR and ILOR have been normalized with the average of unity and shown in Fig. 1. The area in Fig. 1 is divided into 4 quadrants with the boundary lines 1.0 for ICOR and 0.6 ILOR. The choice of these boundary lines is purely a matter of convenience.

In the case of developing countries, savings for capital accumulation are generally scarce and most capital goods must be imported from abroad. Therefore, less capital intensive industries are desirable in terms of availability of savings and limitations of foreign exchanges. On the other hand, labor intensive industries are desirable to developing countries, where large surpluses of labor exist.

From this point of view, the most desirable industries are classified in quadrant IV of Fig. 1, where industries are less capital intensive and more labor intensive than the industrial average. These industries are, namely, textile, transport equipment, fabricated metal, electric machinery, food manufacturing and non-metallic mineral. Among these, the textile industry has a significantly high ILOR, i.e., 2,605 person per Rps 1 billion, and its ICOR is one of the lowest. Therefore, the textile industry is especially suitable for the industrialization of the country. Industries in quadrant III are neither labor intensive nor capital intensive. These industries include chemical and petroleum products (industrial chemicals, other chemicals and rubber products), machinery (control equipment) and other manufacturing.

These industries may also be desirable. However, their labor requirement is smaller than industries in quadrant IV. Industries in quadrant II are more capital intensive

3) Departemen Perindustrian, *Penghitungan Capital Output Ratio Sektor Industri, 1983* and *Penghitungan Labor Output Ratio Sektor Industri, 1983*. Data for petroleum and its products are not available in these books.

and less labor intensive. Industries in quadrant I are more capital intensive as well as more labor intensive. In that quadrant, only the wood product industry is included. Industries in quadrant I and II may not be desirable in terms of ICOR and ILOR. However, some of these industries are exporting their products intensively. Therefore, we should keep in mind that evaluation by ICOR and ILOR is only one method of evaluation. Others are still useful and necessary. Industry in the quadrant I includes wood products, while industries in the quadrant II include basic metals, plastic products and paper printing. Industries in the quadrant III are neither labor intensive nor capital intensive.

As we observed, the transportation equipment industry had a relatively significant role in Indonesia in terms of output among ASEAN countries and its capital and labor intensity seems desirable. The rubber product industry also performs well in terms of export, and the normalized ICOR of this industry (0.226) is the lowest of the Indonesian manufacturing industries. However, the normalized ILOR is also the lowest (0.026). Therefore, unlike the transportation equipment industry, much employment may not be expected from this industry.

III International Linkage Analysis for Manufacturing Sectors

1. International Input-Output Table Framework

An input-output table for a country describes inter-industrial transactions among its domestic industries. However, transactions between domestic industries and foreign countries (or outside regions) are treated in lump sums under the names of import and export. Therefore, this table does not clarify to which foreign industry the export is done and from which country (or region) the import is done. In order to analyse international (or inter-regional) trade in terms of international division of

Export \ Import	Sector	Country A 1 ····· n	Country B 1 ····· n	Country C 1 ····· n	Final Demand	Total Output
Country A	1 ⋮ n	X^{AA}	X^{AB}	X^{AC}	F^{A}	X^{A}
Country B	1 ⋮ n	X^{BA}	X^{BB}	X^{BC}	F^{B}	X^{B}
Country C	1 ⋮ n	X^{CA}	X^{CB}	X^{CC}	F^{C}	X^{C}
Gross Value Added		V^{A}	V^{B}	V^{C}		
Total Input		X^{A}	X^{B}	X^{C}		

Fig. 2 International Input-Output Table

labor and interdependent economic relationship, the input-output relationship should be clarified by industry as well as by country. An international (inter-regional) input-output table Fig. 2, has been formulated for the analysis.

Hatched areas X^{AA}, X^{BB} and X^{CC} in Fig. 2 correspond to domestic input-output tables of countries A, B and C, respectively. X^{AB} and X^{AC} are exports of country A to countries B and C. X^{BA} and X^{CA} are imports country A from countries B and C. In other words, areas X^{RS} (R not equal S) correspond to trade matrices. Final demands F^A, F^B and F^C are each country's final demands. Therefore, X^A, X^B and X^C in the right hand column are each country's total outputs. Finally, V^A, V^B and V^C are gross value added in each country.

2. *International Dependency of Industrial Development*

International Dependency

Let us suppose that final demand occurs in country A. To satisfy this final demand, direct and indirect demands, are induced according to the technological structure of the country A's industries. These direct and indirect demands will first affect domestic industrial activities. Further, if domestic supply cannot sufficiently meet these demands, imports (competitive imports) are induced from country B and other countries. In another case (non-competitive imports), let us suppose that final demand for product P (automobile, for example) occurs in country A. To produce this product P, parts Q (diesel engine for automobile) are required due to the technological structure in country A. Since parts Q are not produced in country A, and they are produced in country B, import of parts Q from country B is induced by country A.

In either case, final demand of country A will affect economic activities of all industries in country A, as well as B and other countries. In others words, final demand of a country relates directly and indirectly to each country's industrial activities.

W. Isard and W. W. Leontief [1953] formulated an international (inter-regional) input-output model. By applying this model to the problem stated above, we can determine how much ultimate demand will be induced in each country by the final demand of a country. Therefore, this model clarifies quantitatively the degree of international dependence of industries.

Let us suppose that production of industry i in country A depends on final demands of countries A, B and C. Then K^{AA}, K^{AB} and K^{AC} represent factors in showing how industry i ultimately depends on these final demands. These ultimate degrees of dependence are defined as:

$$K_i^{AA}=\left(\sum_{j=1}^{n} b_{ij}^{AA} f_j^A\right)/X_i^A$$

$$K_i^{AB}=\left(\sum_{j=1}^{n} b_{ij}^{AB} f_j^B\right)/X_i^A$$

$$K_i^{AC}=\left(\sum_{j=1}^{n} b_{ij}^{AC} f_j^C\right)/X_i^A$$

The term b_{ij}^{RS} is an element of Leontief inverse matrix of the international (inter-regional) input-output model. The term f_j^R shows final demand of product j in country R and X_j^R shows production of industry j in country R.

Fig. 3 shows how each country's total production depends ultimately on domestic and foreign final demands. This figure is determined from the international input-output table for five ASEAN countries, Japan, USA and Korea. As shown in Fig. 3, Singapore has the highest ultimate degree of dependence of its total production on foreign final demand (49.6%). The second highest country is Malaysia (32.7%). The third is Korea (23.4%) and the lowest is USA (8.4%).

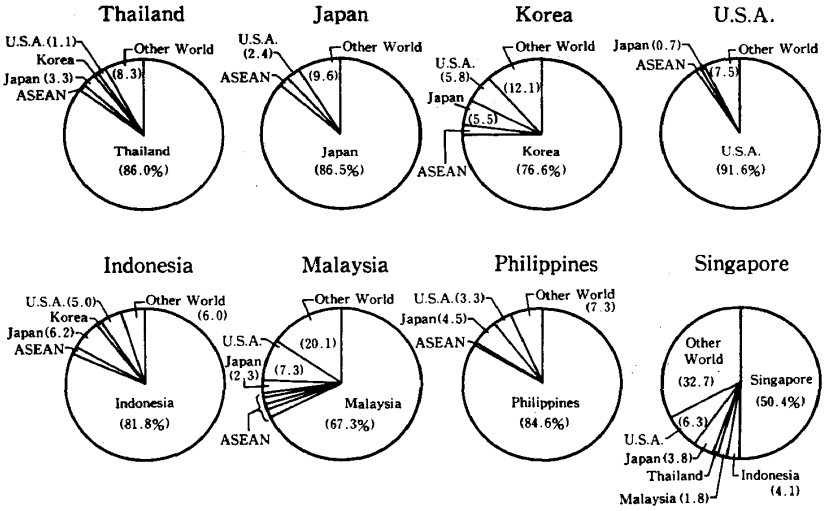


Fig. 3 Ultimate Degree of Dependence of Total Outputs in the Eight Countries on Final Demands of Each Country

Singapore's dependence on foreign countries is close to 50%. The Singapore domestic economic condition is, therefore, affected considerably by the world business cycle. Any protectionistic tendency in the world market due to this business cycle actually amplifies the damage into the economy of that country. At the same time, domestic economic policy only has a small influence on Singapore's economy. Such a country must strengthen international competitiveness of its domestic industries. In contrast, USA and Japan have approximately 90% dependence on their own final demands. These two most industrialized countries have highly interrelated industries within their own borders.

Malaysia's dependence on foreign demand is greater than 30%, which is the next highest to that of Singapore. Foreign dependence of Indonesia is slightly below 20%. This percentage is relatively low among ASEAN countries. Thailand and Philippines have similar foreign dependence, around 15%, These three countries are, not as exposed to foreign economies as Singapore and Malaysia.

The industrialization strategy for Indonesia, Philippines and Thailand emphasize export promotion to industrialized countires, such USA and Japan. Korea has 5.5% and 5.8% of its gross output generated by final demands of Japan and USA, respectively. Additionally, it should be noted that intra-ASEAN economic activities are still small.

As is shown in Fig. 3, the ultimate degree of interdependence of total output among ASEAN countries is very small except for Singapore. Each ASEAN country's ultimate dependence on other ASEAN countries is smaller than their dependence on USA and Japan. The Indonesian ultimate degree of dependence is shown in detail in Appendix 7. The data in Appendix 7 show that Indonesia depends less on the other four ASEAN countries than on Japan and USA for all products except rubber

products, for which dependence on Japan is minor. The Indonesian ultimate degree of dependence on domestic final demand is generally high at more than 90%, excluding petroleum and rubber products. Petroleum depends especially on Japanese demand (27.8%) and rubber depends mainly on American demand (39.85%).

Export structure

Almost all ASEAN countries export their manufacturing products to USA and Japan more than to other ASEAN countries. Table 7 shows the ASEAN countries' percentage of exports to other ASEAN countries as well as to Japan, Korea and USA. Korea, USA and Japan are conspicuously large in their share. Again, intra-ASEAN trade of manufactured products is very small.

Nevertheless, the inter-ASEAN trade is worth analysing as it sheds light on the potential for expansion of Indonesian exports.

In order to analyse intra-ASEAN trade, coefficients on intensities of export and import linkage of each country will be introduced. In the case of Indonesia, intensity of import linkage is an indicator which depicts the degree of Indonesia's importance to the other ASEAN countries as a supplier of a product. By way of example, take food as an example in Thailand. Appendix 9 shows that around 47.82% of all food imported by Thailand from other ASEAN countries originates from Indonesia. Percentage caluclated in this manner is called the intensity of import linkage (IIL) between these two countries.

Intensity of export linkage defined by commodity is an indicator which reflects the degree of the other ASEAN countries's significance to the Indonesian economy. In the example above, 9.8% of all food exported by Indonesia to other ASEAN countries is imported by Thailand. Percentage calculated in this manner is called the intensity of export linkage (IEL) between two countries.

These coefficients can be defined both by commodity and by types of demand, i.e., food product for intermediate demand, or textile for final demand, and so on.

Usage of these coefficients for international economic analysis will be demonstrated with Fig. 4. Type A and B countries in Fig. 4 would much depend on Indonesian exports, therefore, we should regard that Indonesian products are internationally competitive to these countries. Accordingly, export promotion would be

Table 7 Exports of Manufacturing Products of ASEAN Countries in 1975

(%)

To From	Indonesia	Malaysia	Philippines	Singapore	Thailand	Japan	Korea	U.S.A.	Total
Indonesia	—	1.28	0.05	22.01	0.31	41.73	0.75	33.85	100.00
Malaysia	0.93	—	0.33	19.29	1.65	16.08	6.01	55.71	100.00
Philippines	1.02	0.32	—	1.66	0.52	42.79	1.16	52.54	100.00
Singapore	24.65	11.72	0.60	—	3.40	25.64	0.33	33.66	100.00
Thailand	2.80	7.26	2.71	7.85	—	52.30	1.87	25.21	100.00

Source: Institute of Developing Economies [1982]

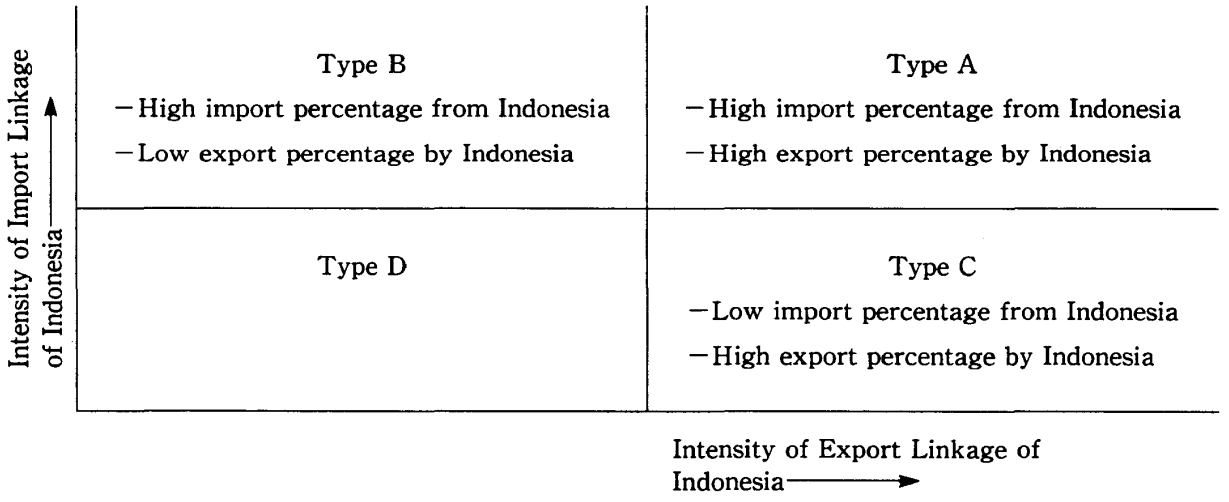
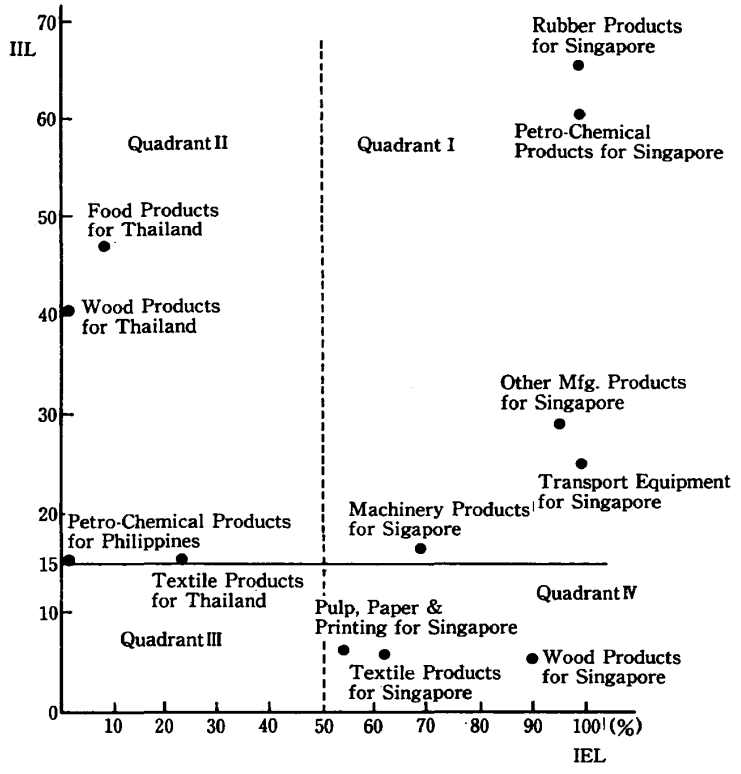


Fig. 4 Intensities of Export and Import Linkages

effective to these countries. Especially, type A countries are the most important for Indonesia, because the export of Indonesia to these countries scores at considerable percentage.

Type C countries may not regard Indonesia as an important supplier, however, these countries are still important for Indonesia because Indonesia exports to these countries at high percentage.

For a better indication of competitiveness, several other factors need to be considered, such as performance of Indonesian exported products over time, prospect of world



Classification of Indonesian Commodities with respect to International Trade for the Partner Countries

	for Singapore	IIL	IEL
Quadrant I. (IIL High) (IEL High)	Rubber Products	65.41%	99.97%
	Petro-Chemical	61.77	95.20
	Other Mfg.	29.64	94.18
	Transport Equip.	25.47	100.00
	Machinery Products	17.41	69.16
	for Thailand	**IIL**	**IEL**
Quadrant II. (IIL High) (IEL Low)	Food Products	47.82	9.83
	Wood Products	40.48	1.99
	Textile	16.20	24.00
	for Philippines		
	Petro-Chemical	16.36	2.30
	for Singapore	**IIL**	**IEL**
Quadrant IV. (IIL Low) (IEL High)	Wood products	5.90	90.64
	Textile	6.27	61.97
	Paper, Pulp & Print	7.24	56.52

Fig. 5 Intensities of Export and Import on Indonesian Commodities

competition, etc.

Fig. 5 and the accompanying data show the classification method for A, B, C and D. Since each product type attached to the country name, we can see which products have high intensity of import and export linkage for these countries. It should be noted that Singapore is in Quadrant I in this figure. Yet, products exported to Singapore might be reexported to others countries as well.

The intensities of import and export linkage calculated above are based on the total of intermediate and final demands, excluding changes of inventories. However, export and import are analyzed in more detail by classifying them into two groups. One group is the commodity exported and imported for final demand (excluding changes of inventories), and the other group is that of intermediate demand use. We do not perform analysis concerning the distinction between intermediate and final demands. Interested readers may further analyse the intensities based on data shown in Appendix 9.

3. *International Comparison of Inter-industrial Linkage*

In the industrialization process of developing countries, investment in new industries have two kinds of repercussion effects. First, investment in a new sector, occuring from the purchase of another sector's products as intermediate goods, stimulates other sector to increase their production. This effect is called backward linkage. Second, investment in a new sector provides intermediate goods for other user production. Thus, other sectors are induced to increase their production. This is called forward linkage. Therefore, concentrating investment on sectors which have high forward and backward linkages can accelerate industrialization of developing countries.

We can identify the important industrial sectors for economic development by reference to the backward and forward linkage multipliers.[4] And, of course, we should consider cost and efficiency aspects to complement this linkage analysis, so as to avoid inefficiency in the development process.

In this section, we analyse characteristics of industries in each country by international comparison of the linkage coefficients calculated by the Japan-USA-ASEAN international input-output model.

The backward linkage coefficient, which indicates relative size of backward linkage

4) See Hirschman [1958]. Hirschman pointed out that "The knowledge of the approximate ranking of industry from the point of view of forward and backward linkage effects as derived from existing developed economies through their input-output tables is, I believed, useful to the economist-planner in underdeveloped areas. It is something to be added to his criteria-box". Thus, he suggested that these coefficients are useful to find industries for development strategy. However, as Hirschman cautioned, disturbance factors may arise in the economic development process in developing countries that are designed to stimulate forward and backward linkages. For example, stimulation for development may be totally absorbed into imports and cause problems in balance of payments. In another case this stimulation may hit the ceiling for input production capacity and inflation. In addition comparative cost is not considered at all when selection of key industries is done by linkage coefficients.

of an industry, can be expressed as follows:

$$B_j^s = \frac{\sum_{r=1}^{k}\sum_{i=1}^{n} b_{ij}^{rs}}{(1/nk)\sum_{r=1}^{k}\sum_{s=1}^{k}\sum_{i=1}^{n}\sum_{j=1}^{n} b_{ij}^{rs}}$$

Where k is the number of countries.

The numerator of this equation is a vertical sum of j th clumn elements of the Leontief inverse matrix. The denominator is average of the vertical sums of all industries. In the same manner forward linkage can be expressed as:

$$D_i^r = \frac{\sum_{s=1}^{k}\sum_{j=1}^{n} b_{ij}^{rs}}{(1/nk)\sum_{r=1}^{k}\sum_{s=1}^{k}\sum_{i=1}^{n}\sum_{j=1}^{n} b_{ij}^{rs}}$$

Linkage coefficients provide useful information to identity important industries for economic development policy. In the case of the international input-output table, the average of linkage coefficients of all industries in all countries is unity.

Therefore, in some countries the average of linkage coefficients of all industries is more than unity, and in other countries it is less than unity.

Here, let us compare backward linkage coefficients of manufacturing industries calculated by the ASEAN-Japan-Korea-USA international input-output table.

Table 8 shows that backward linkage coefficients of all industries are more than unity in Japan, USA, Korea and Singapore and less than unity in the four ASEAN countries.

In descending order of backward linkage coefficients are Philippines, Thailand, Indo-

Table 8 International Comparison of Backward Linkage Coefficients for Manufacturing Industries, 1975

	Indonesia	Malaysia	Philippines	Singapore	Thailand	Japan	Korea	U.S.A.
Food Manufacturing	1.033	1.070	1.125	1.157	1.090	1.320	1.224	1.642
Textile and Its Products	1.202	1.124	1.234	1.068	1.186	1.386	1.496	1.166
Wood and Wood Products	1.024	0.913	1.099	1.289	1.014	1.281	1.259	1.055
Pulp, Paper and Printing	0.948	0.983	0.936	1.002	1.003	1.356	1.276	1.049
Chemical	1.024	1.141	1.058	1.220	1.059	1.377	1.303	1.100
Petro-chemical	1.050	0.599	0.696	0.680	0.642	0.803	0.726	1.378
Rubber Products	1.132	1.020	1.170	1.529	1.048	1.276	1.395	1.105
Non-ferrous Mineral Products	0.899	0.916	1.086	1.112	1.029	1.211	1.118	1.041
Metal Products	1.131	1.031	1.201	1.203	1.180	1.453	1.575	1.187
Machinery Products	1.015	1.084	1.216	1.169	1.105	1.360	1.328	1.058
Transportation Equipments	1.081	1.163	1.215	1.114	1.193	1.435	1.334	1.218
Total Economy Average	0.886	0.874	0.952	1.040	0.910	1.159	1.075	1.104

Note: In deriving the linkages, the above countries are interlinked together, while the rest of world is treated as exogenous.

Source: Institute of Developing Economies [1982]

nesia and Malaysia. In general, the more a country is industrialized, the higher the average of backward linkage coefficients of all industries becomes.

Now let us look at the backward linkage coefficients in the main sectors of manufacturing industry in the five ASEAN countries. In the food sectors Singapore has highest coefficient, followed by Philippines, Thailand, Malaysia and Indonesia, in that order. In the textile and textile products sector, Philippines has the highest coefficient, followed by Indonesia, Thailand and Malaysia and Singapore. In the chemical sector, the highest is Singapore, then Malaysia, Thailand, Philippines and Indonesia follow. In the petro-chemical sector, Indonesia stands out, followed by Philippines, Singapore, Thailand and Malaysia. In metal products, Korea has the highest backward linkage coefficient; Singapore comes first among the five ASEAN countries, followed by Philippines, Thailand, Indonesia and Malaysia. In both the machinery products and transport equipment sector, Philippines has the highest and Indonesia has the lowest coefficient. Singapore, Thailand and Malaysia are ranked in between those two countries. However, in the transport equipment sector, Thailand, Malaysia and Singapore rank in descending order.

In Japan, the sectors which have the highest backward linkage coefficients among the eight countries are pulp, paper and printing, chemical non-ferrous mineral, and machinery products. Additionally, the transportation equipment, and machinery product sectors have conspiciously high coefficients. These large values correspond with the fact that these sectors led Japan's economic growth during 1970's.

USA has two sectors, food manufacturing and petrochemicals, which hold the position of highest backward linkage coefficient among the eight countries. The pulp, paper and printing and transportation equipment sectors have the third largest coefficients. Chemical, non-ferrous mineral, and metal products sectors both have the fifth largest coefficients. The coefficient of the textile and textile products sector is sixth among the eight countries.

The aforementioned observation helps to explain the background of the 1970's economic situation in which chemical, metal products, machinery and other sectors contributed to the development of Japan and certain NICs, such as Korea and Singapore. Stagnation in the US economy in the 1970's, to a certain degree, might be a reflection of these observations.

Next, let us internationally compare forward linkage coefficients in Table 9. The forward linkage coefficient is a supplementary factor to the backward linkage coefficient. The forward linkage coefficient indicates how strongly an increase in production of a sector stimulates production in other sectors.

The forward linkage coefficients calculated by the ASEAN-Japan-USA-Korea international input-output table are more than unity for Japan and USA, less than unity for the other countries, though the average of all industries in all countries is unity.

Let us analyse forward linkage of the five

Table 9 International Comparison of Forward Linkage Coefficients for Manufacturing Industries, 1975

	Indonesia	Malaysia	Philippines	Singapore	Thailand	Japan	Korea	U.S.A.
Food Manufacturing	0.777	1.236	0.926	1.090	1.033	1.175	0.964	1.159
Textile and Its Products	0.898	0.818	0.863	0.694	1.050	1.403	1.181	1.025
Wood and Wood Products	0.724	0.845	0.765	0.830	0.716	0.870	0.683	0.707
Pulp, Paper and Printing	0.882	0.712	0.746	0.671	0.744	1.852	0.923	1.232
Chemical	0.691	0.789	0.909	0.985	0.807	3.538	1.406	2.282
Petro-chemical	0.786	1.095	1.484	1.118	1.190	1.848	1.517	1.345
Rubber Products	1.172	0.832	0.657	1.030	0.713	0.721	0.636	0.653
Non-ferrous Mineral Products	0.625	0.733	0.661	0.816	0.684	0.985	0.754	0.802
Metal Products	0.715	0.914	1.025	0.818	0.955	4.964	1.504	2.426
Machinery Products	0.661	0.653	0.671	0.874	0.818	1.909	0.810	1.721
Transportation Equipments	0.757	0.674	0.695	0.786	0.711	1.482	0.679	0.837
Total Economy Average	0.840	0.826	0.867	0.850	0.850	1.559	0.925	1.284

Source: Institute of Developing Economies [1982]

ASEAN countries by the primary manufacturing sectors. In the food sector, Malaysia has the largest forward linkage coefficient, exceeding even Japan and USA. It is followed by Singapore, Thailand, Philippines, and Indonesia. In textile products, the coefficient is largest in Thailand, then Indonesia, Philippines and Singapore in descending order. Among the five ASEAN countries, Singapore has the largest coefficient in chemical, machinery product, and transportation equipment sectors. Philippines has the largest coefficient in petro-chemical and metal product sectors.

Further, among the eight countries, Japan has the largest forward linkage coefficients in the textile and textile products, chemical, petro-chemical, metal products, machinery, and transportation equipment sectors. In contrast, Indonesia and Malaysia have low coefficients in chemical, oil, metal products, machinery and other sectors.

Notice that Korea and Singapore, the two newly industrializing countries, have, in general, high forward linkage coefficients in strategic sectors.

IV Future Aspects of Industrialization in Indonesia

1. Towards an Industrial Society

Industrial development is regarded as an essential part of economic development for raising the standard of living. In this process the industrial sector is expected to develop and become stronger, as reflected in stronger linkages between small, medium and large industries, and higher competi-

tiveness that enable it to contribute much more significantly to the foreign exchange earnings of the country. Promotion of manufactured export products is essential for sustaining development and should be regarded as a national goal to be throughly implemented. Efforts to strengthen export product competitiveness in international markets with respect to price, quality and services should be made continually.

Given the unfavourable prospect of oil, foreign exchange earnings from oil should not be expected to rise significantly. To earn foreign exchange, promotion of non-oil and non-LNG should be stressed. Policies to promote non-oil and non-LNG exports should be aimed at achieving fundamental changes in the export structure through strengthening the competitiveness of Indonesian export products in foreign markets.

Export promotion policies should be formulated within the framework of structural change in the overall economy which will realize a higher rate of growth for the industrial sector relative to the agricultural sector.

Monetary, fiscal and trade policy measures should be directed to complement industrial policy in such a way that the manufactured products become more competitive with respect to price, quality, time delivery and other services.

The rupiah-foreign currency exchange rate should be maintained at a level which does not reduce (and may actually increase) the international competitiveness of Indonesian products.

2. Future Trends of Industrialization in Indonesia

Based on the objectives identified in the Guidelines of State Policy (GBHN) and other considerations, including an economic and industrial structure in line with the previous section, industrialization in the coming years, specifically in Repelita V (The Fifth National Development Plan), and perhaps in some years beyond that, should focus on some priorities, such as machinery industries, high linkage industries, industries for export, labor intensive industries, small scale industries, and certain industries which are considered to be strategic for national security.

Machinery industries, as pointed out, are lagging far behind those in the neighboring countries, not only in terms of their percentage shares in manufacturing value added or in the economy as a whole, but also in terms of their absolute output value. As shown in Appendix 1, and reflected in Appendix 3, the output of Indonesia's machinery and metal products industry was quite small. It was less than Thailand, and much less than Malaysia and Singapore, despite of the smaller sizes of those countries.

The report also analized various types of industries in terms of backward and forward linkages both for direct and total linkages. This linkage consideration is very important. A lot of the stimulus coming from elements of final demand has not been translated into more output, employment or other related aspects, but instead gone to imports, because of the lack of linkages. Yet, it is also important to

realize that linkages can also give rise to inefficiency if they are not properly exploited. Inefficiency from one type of industry can be transferred and disseminated to other parts of the industry through linkage which eventually result in lower competitive power of the industry as a whole.

It is clear that the availability of foreign exchange is very important for the self-sustaining development process. Perhaps it is not an exaggeration to say that one of most binding constraints of the development of Indonesia in the coming year will be foreign exchange. Approximately two thirds to three quarters of the foreign exchange from exports has been coming from oil and gas. Oil and gas also contributed around one half to two thirds of the domestic government revenue. But the future of the oil industry is very uncertain, affected by so many variables both on the demand and supply side. According to many forecasts, the prospect of oil in the next few years does not look very bright. Recognizing this situation several years ago, the government of Indonesia decided to strive for diversification and adopted policies to foster the export of non-oil and non-LNG related manufactured products. It is clear that to be able to export, one of the necessary conditions is competitiveness of the products vis-a-vis products in the world market. Efficiency, therefore, is extremely significant in this matter.

In Repelita IV, it is estimated that there are 9.3 million new entrants to the labor force. This requires employment creation in all areas of economic activity including manufacturing. The majority of employment in manufacturing activities is in small scale industries. These small scale industries also contribute to foreign exchange earning and a large number of them are located in rural areas, creating a higher income for the people in those areas.

Electronics industries are on the priority list and are considered strategic. Moreover, they are generally labor intensive. Yet, the very fast technological changes in some industries have also affected some segments of these electronic industries. In other countries some segments of these industries have been robotized, resulting in lower product cost. Products produced by the labor intensive technique have become less competitive. The strategic nature of these industries, their contribution to employment and the effect of technological changes on them, of course, affects how these industries should be developed. Engineering design is one of the fields in which Indonesia is still lagging behind. The government realizes the importance of this field and has put it on the priority list. Some other industries which are considered strategic are also on the priority list, such as steel, electronic and other industries related to security and defence. As already briefly discussed, these priorities are interconnected, and are not necessarily all consistent with each other.

The analysis in Kaneko, Tampubolon and Yanagi [1986] showed that exported manufactured products, for example, have tended to be capital instead of labor intensive. Proper exploitation of linkages is critical to actually achieve economic

advantages and benefits and not lead to lower competitive power, and thus, to fewer exports. It is worth-noting that developing these various priority industries should be selected judiciously, taking into account such important elements as efficiency, equity, ability to sustain growth, etc., especially in consideration of the possibility of an oil glut and the protracted world economic recession that have been affecting the Indonesian economy.

Various elements involved in the industrial structure of a nation have been presented here. These elements should be taken into consideration to increase the effectiveness and efficiency of future development efforts.

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Appendix 1 Total Output of ASEAN Countries, 1975

(1,000 US$)

	Indonesia	Malaysia	Philippines	Singapore	Thailand	ASEAN Total
Food, beverage, and tobacco	8,509,071	2,215,957	5,277,601	1,122,639	4,853,464	21,978,732
Textile, leather, and its products	1,456,968	370,688	1,079,905	545,669	1,756,888	5,210,118
Lumber and wooden products	496,070	386,456	470,740	408,728	423,146	2,185,140
Pulp, paper and printing	292,121	151,211	410,585	128,824	310,752	1,293,493
Chemical products	508,153	239,773	565,014	355,902	488,287	2,157,129
Petroleum and its products	854,604	373,213	1,206,724	2,018,759	827,479	5,280,779
Rubber products	504,120	869,148	132,600	324,506	295,669	2,126,043
Non-metallic mineral products	313,838	175,755	287,711	198,454	279,374	1,255,132
Metal products	568,828	998,877	703,682	351,610	730,419	3,353,416
Machinery	380,030	519,330	365,714	1,209,742	448,101	2,922,917
Transport equipment	1,735,926	154,480	573,821	539,761	775,589	3,779,577
Other manufacturing products	160,480	201,703	215,728	347,859	391,369	1,317,139
Total of Manufacturing Sectors	15,780,209	6,656,591	11,289,825	7,552,453	11,580,537	52,859,615

Source: Institute of Developing Economies [1982]

Appendix 2 Percentage of Output by Manufacturing Industry in ASEAN Countries, 1975

Industry	Indonesia	Malaysia	Philippines	Singapore	Thailand	ASEAN Total
1. Consumption Goods						
Food, beverage, and tobacco	53.92	33.28	46.75	14.86	41.92	41.60
Textile, leather, and its products	9.23	5.57	9.55	7.23	15.16	9.86
Lumber and wooden products	3.14	5.81	4.18	5.41	3.64	4.14
Pulp, paper and printing	1.85	2.27	3.63	1.71	2.69	2.44
Chemical products	3.22	3.61	5.01	4.70	4.22	4.09
Petroleum and its products	5.42	5.61	10.68	26.73	7.15	9.98
Rubber products	3.20	13.93	1.17	4.30	2.56	4.03
Subtotal	79.98	69.21	80.96	64.94	77.34	76.15
2. Capital Goods						
Non-metallic mineral products	1.99	2.64	2.56	2.63	2.40	2.36
Metal products	3.61	15.02	6.24	4.65	6.30	6.34
Machinery	2.41	7.79	3.24	16.02	3.88	5.52
Transport equipment	11.00	2.31	5.09	7.15	6.70	7.14
Other manufacturing products	1.01	3.03	1.91	4.61	3.38	2.49
Subtotal	20.02	30.79	19.04	35.06	22.66	23.85
Total	100.00	100.00	100.00	100.00	100.00	100.00

Source: The same as Appendix 1.

Appendix 3 Total Output of Each Manufacturing Industry in ASEAN Countries, 1975

(%)

	Indonesia	Malaysia	Philippines	Singapore	Thailand	ASEAN Total
Food, beverage, and tobacco	38.72	10.08	24.01	5.11	22.08	100.00
Textile, leather, and its products	27.96	7.11	20.73	10.47	33.72	100.00
Lumber and wooden products	22.70	17.69	21.54	18.70	19.36	100.00
Pulp, paper and printing	22.58	11.69	31.74	9.96	24.02	100.00
Chemical products	23.56	11.12	26.19	16.50	22.64	100.00
Petroleum and its products	16.18	7.07	22.85	38.23	15.67	100.00
Rubber products	23.71	40.88	6.24	15.26	13.91	100.00
Non-metallic mineral products	25.00	14.00	22.92	15.81	22.26	100.00
Metal products	16.96	29.79	20.98	10.49	21.78	100.00
Machinery	13.00	17.77	12.51	41.39	15.33	100.00
Transport equipment	45.93	4.09	15.18	14.28	20.52	100.00
Other manufacturing products	12.18	15.31	16.38	26.41	29.71	100.00
Total of Manufacturing Sectors	29.85	12.59	21.36	14.29	21.91	100.00

Source: The same as Appendix 1.

Appendix 4 Value Added of Each Industry in ASEAN Countries 1975

(1,000 US$)

	Indonesia	Malaysia	Philippines	Singapore	Thailand	ASEAN Total
Food, beverage, and tobacco	2,316,940	704,172	1,451,911	317,703	514,665	6,305,391
Textile, leather, and its products	459,871	116,542	300,123	206,559	584,525	1,667,620
Lumber and wooden products	197,921	187,260	141,739	71,295	168,436	766,651
Pulp, paper and printing	133,560	58,285	212,115	45,748	118,980	568,688
Chemical products	198,859	69,980	178,373	67,994	178,372	693,578
Petroleum and its products	207,628	81,845	138,487	233,275	102,770	864,005
Rubber products	120,265	293,265	40,523	53,727	111,953	619,733
Non-metallic mineral products	168,108	77,477	89,564	71,980	110,981	518,110
Metal products	164,625	328,748	204,249	110,570	217,740	1,025,932
Machinery	123,045	182,748	107,338	388,235	145,379	946,745
Transport equipment	610,348	44,113	144,679	236,158	209,548	1,244,846
Other manufacturing products	53,725	124,397	54,997	79,901	207,912	520,932
Total of Manufacturing Sectors	4,754,895	2,268,832	3,064,098	1,883,145	3,771,261	15,742,231

Source: The same as Appendix 1.

Appendix 5 Value Added Ratio of Each Industry in ASEAN Countries, 1975

(%)

	Indonesia	Malaysia	Philippines	Singapore	Thailand	ASEAN Total
Food, beverage, and tobacco	27.23	31.78	27.51	28.30	31.21	28.69
Textile, leather, and its products	31.56	31.44	27.79	37.85	33.27	32.01
Lumber and wooden products	39.90	48.46	30.11	17.44	39.81	35.08
Pulp, paper and printing	45.72	38.55	51.66	35.51	38.29	43.97
Chemical products	39.13	29.19	31.57	19.10	36.53	31.15
Petroleum and its products	24.30	21.93	11.48	11.56	24.50	16.36
Rubber products	23.86	33.74	30.56	15.56	37.86	29.15
Non-metallic mineral products	53.57	44.08	31.13	36.27	39.72	41.28
Metal products	28.94	32.91	29.03	31.45	29.81	30.59
Machinery	32.38	35.19	29.35	32.09	32.44	32.39
Transport equipment	35.16	28.56	25.21	43.75	27.02	32.94
Other manufacturing products	33.48	61.67	25.49	22.97	53.12	39.55
Total of Manufacturing Sectors	30.13	34.08	27.14	24.93	32.57	29.78

Source: The same as Appendix 1.

Appendix 6 Percentage of Value Added by Manufacturing Industry in ASEAN Countries, 1975

Industry	Indonesia	Malaysia	Philippines	Singapore	Thailand	ASEAN Total
1. Consumption Goods						
Food, beverage, and tobacco	48.73	31.04	47.38	16.88	40.16	40.02
Textile, leather, and its products	9.65	5.12	9.78	10.97	15.50	10.57
Lumber and wooden products	4.14	8.23	4.64	3.78	4.47	4.86
Pulp, paper and printing	2.84	2.58	6.90	2.42	3.16	3.61
Chemical products	4.20	3.08	5.82	3.61	4.74	4.41
Petroleum and its products	4.34	3.62	4.53	12.38	5.37	5.51
Rubber products	2.56	12.92	1.34	2.85	2.98	3.96
Subtotal	76.46	66.59	80.39	52.89	76.38	72.94
2. Capital Goods						
Non-metallic mineral products	3.52	3.40	2.93	3.83	2.93	3.31
Metal products	3.46	14.50	6.64	5.87	5.77	6.51
Machinery	2.63	8.10	3.50	20.62	3.84	6.01
Transport equipment	12.82	1.93	4.74	12.55	5.56	7.92
Other manufacturing products	1.11	5.48	1.80	4.24	5.51	3.31
Subtotal	23.54	33.41	19.61	47.11	23.62	27.06
Total	100.00	100.00	100.00	100.00	100.00	100.00

Source: The same as Appendix 1.

Appendix 7 Indonesian Ultimate Degree of Dependence of Total Production on Each Country's Final Demand, 1975

	Indonesia	Malaysia	Philippines	Singapore	Thailand	ASEAN excluding Indonesia	Japan	Korea	U.S.A.	Other World	Total Output
Food, beverage, and tobacco	97.49	0.07	0.00	0.06	0.02	0.15	0.39	0.07	0.33	1.67	100.00
Textile, leather, and its products	98.81	0.03	0.00	−0.02	0.04	0.05	0.50	0.07	0.17	0.68	100.00
Lumber and wooden products	94.78	0.03	0.01	0.14	0.01	0.19	1.08	0.11	0.59	4.22	100.00
Pulp, paper, and printing	93.51	0.03	0.01	0.10	0.02	0.16	1.34	0.30	0.68	4.38	100.00
Chemical products	93.41	0.11	0.01	0.29	0.12	0.53	0.97	0.21	1.58	3.83	100.00
Petroleum and its products	48.29	0.10	0.12	1.92	0.09	2.23	27.87	0.34	8.53	12.36	100.00
Rubber products	24.29	0.38	0.06	9.77	0.22	10.43	3.48	0.09	39.58	9.06	100.00
Non-metallic mineral products	98.30	0.03	0.01	0.03	0.01	0.08	0.50	0.77	0.38	1.07	100.00
Metal products	82.00	0.04	0.04	0.21	0.06	0.35	5.07	0.15	4.21	8.90	100.00
Machinery	86.99	0.66	0.07	1.35	0.03	2.11	3.85	0.12	2.94	3.99	100.00
Transport equipment	94.52	0.02	0.01	0.15	0.01	0.19	1.51	0.19	0.84	2.74	100.00
Other manufacturing products	92.34	0.16	0.01	1.32	0.07	1.56	1.44	0.22	0.87	2.89	100.00
Total of Manufacturing Sectors	91.15	0.08	0.02	0.53	0.04	0.67	2.44	0.13	2.34	3.03	100.00

Source: The same as Appendix 1.

Appendix 8 Incremental Capital/Output Radio (ICOR) and Incremental Labor/Output Ratio (ILOR) of Each Manufacturing Industry in Indonesia

ISIC	Industry	ICOR	Normalized ICOR	ILOR*)	Normalized ILOR
31	Food Manufacturing	2.47	0.607	557	0.403
32	Textiles	2.19	0.538	2,605	1.886
33	Wood Products	3.32	1.754	851	0.616
34	Paper, Printing	4.48	1.101	672	0.487
35	Chemical, Petro-products	2.34	0.575	237	0.299
351	Industrial Chemicals	2.58	0.634	172	0.125
352	Other Chemicals	2.59	0.636	1,449	1.049
355	Rubber Products	0.92	0.226	36	0.026
356	Plastic Products	5.62	1.381	1,059	0.767
36	Non-Metallic Mineral	3.70	0.909	885	0.641
37	Basic Metal	6.50	1.597	470	0.340
38	Machinery	3.32	0.816	486	0.352
381	Fabricated Metal	3.06	0.752	1,232	0.892
382	Machinery	3.75	0.921	187	0.135
383	Electric Machinery	2.79	0.686	960	0.695
384	Transport Equipment	2.50	0.614	1,394	1.009
385	Control Equipment etc.	2.06	0.506	512	0.371
39	Other Manufacturing Products	2.20	0.540	797	0.577
	Total Manufacturing	4.07	1.000	1,381	1.000

Source: Departemen Perindustrian dan Biro Pusat Statistik, 1983. *Penghitungan Capital Output Ratio Sektor Industri.*
Departemen Perindustrian dan Biro Pusat Statatistik, 1983. *Penghitungan Labor Output Ratio Sektor Industri.*
*) Person/billion Rp.

Appendix 9 Intensities of Export and Import Linkages on Indonesian Commodities, 1975

IEL = Intensity of Export Linkage
IIL = Intensity of Import Linkage (%)

Commodity	Food Products					
Type of demand	Intermediate		Final		Total	
	IEL	IIL	IEL	IIL	IEL	IIL
Malaysia	35.81	5.41	48.77	15.60	44.46	10.38
Philippines	0.05	0.65	0.55	0.25	0.38	0.26
Singapore	56.46	3.51	39.79	5.40	45.33	4.41
Thailand	7.69	43.41	10.89	49.58	9.83	47.82
ASEAN Total	100.00	4.23	100.00	7.33	100.00	5.90

Commodity	Textile Products					
Type of demand	Intermediate		Final		Total	
	IEL	IIL	IEL	IIL	IEL	IIL
Malaysia	3.63	1.57	74.38	6.28	14.03	3.78
Philippines	—	—	—	—	—	—
Singapore	70.23	18.7	14.05	0.31	61.97	6.27
Thailand	26.14	20.84	11.57	4.14	24.00	16.20
ASEAN Total	100.00	7.92	100.00	1.35	100.00	4.61

Commodity	Wood Products					
Type of demand	Intermediate		Final		Total	
	IEL	IIL	IEL	IIL	IEL	IIL
Malaysia	5.96	7.99	42.42	2.35	7.37	5.22
Philippines	—	—	—	—	—	—
Singapore	93.19	6.92	27.27	0.44	90.64	5.91
Thailand	0.85	58.33	30.30	33.33	1.99	40.48
ASEAN Total	100.00	6.63	100.00	1.10	100.00	5.55

Commodity	Paper, Pulp & Printing					
Type of demand	Intermediate		Final		Total	
	IEL	IIL	IEL	IIL	IEL	IIL
Malaysia	28.57	1.61	66.67	0.41	43.48	0.25
Philippines	—	—	—	—	—	—
Singapore	71.43	0.74	33.33	0.68	56.52	0.72
Thailand	—	—	—	—	—	—
ASEAN Total	100.00	0.26	100.00	0.38	100.00	0.30

Commodity	Metal Products					
Type of demand	Intermediate		Final		Total	
	IEL	IIL	IEL	IIL	IEL	IIL
Malaysia	2.66	0.20	—	—	2.17	0.11
Philippines	—	—	—	—	—	—
Singapore	72.95	2.11	51.61	2.00	69.03	2.09
Thailand	24.40	1.81	48.39	4.09	28.80	2.18
ASEAN Total	100.00	0.64	100.00	0.72	100.00	0.65

Commodity	Machinery Products					
Type of demand	Intermediate		Final		Total	
	IEL	IIL	IEL	IIL	IEL	IIL
Malaysia	19.44	5.54	39.21	5.96	30.84	5.84
Philippines	—	—	—	—	—	—
Singapore	80.56	17.68	60.79	17.16	69.16	17.41
Thailand	—	—	—	—	—	—
ASEAN Total	100.00	6.81	100.00	5.64	100.00	6.08

Commodity	Transport Equipment					
Type of demand	Intermediate		Final		Total	
	IEL	IIL	IEL	IIL	IEL	IIL
Malaysia	—	—	—	—	—	—
Philippines	—	—	—	—	—	—
Singapore	100.00	15.81	100.00	34.79	100.00	25.47
Thailand	—	—	—	—	—	—
ASEAN Total	100.00	2.55	100.00	2.25	100.00	2.33

Commodity	Other Manufacturing Products					
Type of demand	Intermediate		Final		Total	
	IEL	IIL	IEL	IIL	IEL	IIL
Malaysia	1.94	1.55	12.02	2.19	4.13	1.90
Philippines	—	—	—	—	—	—
Singapore	97.52	38.44	82.09	14.94	94.18	29.64
Thailand	0.53	1.25	5.90	0.88	1.70	0.95
ASEAN Total	100.00	21.91	100.00	4.68	100.00	12.20

Commodity	Chemical Products					
Type of demand	Intermediate		Final		Total	
	IEL	IIL	IEL	IIL	IEL	IIL
Malaysia	21.86	2.38	35.63	4.37	24.56	2.73
Philippines	0.60	0.66	1.23	5.80	0.72	6.32
Singapore	49.82	10.00	48.89	8.20	49.64	9.60
Thailand	27.72	12.73	14.25	2.64	25.08	8.93
ASEAN Total	100.00	3.61	100.00	3.53	100.00	3.59

Commodity	Petrochemical Products					
Type of demand	Intermediate		Final		Total	
	IEL	IIL	IEL	IIL	IEL	IIL
Malaysia	2.88	0.42	1.53	0.42	2.30	0.42
Philippines	1.18	16.55	3.78	16.28	2.30	16.36
Singapore	95.72	62.51	94.51	60.80	95.20	61.77
Thailand	0.22	2.48	0.18	2.98	0.20	2.65
ASEAN Total	100.00	3.25	100.00	5.84	100.00	4.02

Commodity	Rubber Products					
Type of demand	Intermediate		Final		Total	
	IEL	IIL	IEL	IIL	IEL	IIL
Malaysia	0.01	3.33	0.21	3.85	0.01	3.40
Philippines	0.01	3.88	0.21	4.65	0.01	4.00
Singapore	99.97	65.97	99.47	29.92	99.97	65.41
Thailand	0.01	2.65	0.11	0.18	0.01	1.55
ASEAN Total	100.00	64.80	100.00	23.47	100.00	64.00

Commodity	non-Metallic Mineral Products					
Type of demand	Intermediate		Final		Total	
	IEL	IIL	IEL	IIL	IEL	IIL
Malaysia	100.00	0.59	100.00	8.33	100.00	0.81
Philippines	—	—	—	—	—	—
Singapore	—	—	—	—	—	—
Thailand	—	—	—	—	—	—
ASEAN Total	100.00	0.19	100.00	0.48	100.00	0.23

Source: The same as Appendix 1.